EXHIBIT G

California State Lands Commission Presurvey Notice Requirements for Permittees to Conduct Geophysical Survey Activities

All parts of the Presurvey Notice must be adequately filled out and submitted to the CSLC staff a minimum of twenty-one (21) calendar days prior to the proposed survey date to ensure adequate review and approval time for CSLC staff. Note that one or more of the items may require the Permittee to plan well in advance in order to obtain the necessary documentation prior to the Notice due date (e.g., permits from other State or Federal entities).

Please use the boxes below to verify that all the required documents are included in the Presurvey Notice. If "No" is checked for any item, please provide an explanation in the space provided. If additional space is needed, please attach separate pages.

Yes	No	
☑	☐	Geophysical Survey Permit Exhibit F
☑	☐	Survey Location (including a full-sized navigation chart and GPS coordinates for each proposed track line and turning point) Explanation: attached and shape file provided
☐	☑	Permit(s) or Authorization from other Federal or State agencies (if applicable) Explanation: No other required
☑	☐	21-Day Written Notice of Survey Operations to Statewide Geophysical Coordinator/
☑	☐	U.S. Coast Guard Local Notice to Mariners/
☑	☐	Harbormaster and Dive Shop Notifications Explanation: delivered
☑	☐	Marine Wildlife Contingency Plan Explanation: attached
☑	☐	Oil Spill Contingency Plan Explanation: attached
☑	☐	Verification of California Air Resources Board's Tier 2-Certified Engine Requirement Explanation:
☑	☐	Verification of Equipment Service and/or Maintenance (must verify sound output) Explanation: to be attached
☐	☑	Permit(s) or Authorization from California Department of Fish and Wildlife for surveys in or affecting Marine Protected Area(s) (if applicable) Explanation: None required

NOTE: CSLC staff will also require verification that current biological information was obtained and transmitted as outlined in Section 5 of this permit.

EXHIBIT F

PRESURVEY NOTIFICATION FORM

Applicant/Permittee's Mailing Address

FUGRO PELAGOS INC.

4820 McGRATH STREET SUITE 100

VENTURA, CALIFORNIA 93003

attached and shape file provided

Date: October 17, 2016

Jurisdiction: Federal ☐ State ☐ Both ☑

If State: Permit #PRC 8391

Region: 2

Area: Offshore Long Beach

GEOPHYSICAL SURVEY PERMIT

Check one: ☑ New survey ☐ Time extension of a previous survey

Fugro Pelagos Inc. (Applicant/Permittee) will conduct a geophysical survey offshore California in the survey area outlined on the accompanying navigation chart segment. If you foresee potential interference with commercial fishing or other activities, please contact the person(s) listed below:

FEDERAL WATERS (outside 3 nautical miles)

1) Applicant's representative
2) Federal representative (e.g., Bureau of Ocean Energy Management [BOEM] or National Science Foundation [NSF])

NOTE: Any comments regarding potential conflicts in Federal waters must be received by the Applicant's Representative and lead Federal agency within ten (10) days of the receipt of this notice.

STATE WATERS (Inside 3 nautical miles)

1) Permittee's representative
2) CSLC representative

NOTE: Any comments regarding potential conflicts in State waters should be received as soon as possible by the Permittee's representative, no more than fifteen (15) days after the receipt of this notice.

1. Expected Date of Operation 11/28/2016 - 12/30/2016 (3-4 Days)
2. Hours of Operation Daylight hours
3. Vessel Name M/V Kenneth Carl
4. Vessel Official Number 8978710
5. Vessel Radio Call Sign WDF8246
6. Vessel Captain's Name Bruce Ferguson
7. Vessel will monitor Radio Channel(s) 16
8. Vessel Navigation System DGPS

9. Equipment to be used Side Scan Sonar

a. Frequency (Hz, kHz) 300/600 kHz

b. Source level (dB re 1 μPa at 1 meter (m) [root mean square (rms)]) 213 dB rms

c. Number of beams, across track beamwidth, and along track beamwidth
1 beam, Horizontal: 0.5 deg/0.26 deg; Vertical Beam Width: 50 deg

d. Pulse rate and length 30 Hz/Up to 12 ms (300 kHz) and 5 ms (600 kHz)

e. Rise time N/A

f. Estimated distances to the 190 dB, 180 dB, and 160 dB re 1 μPa (rms) isopleths
160=188m 180=51m 190=9m

g. Deployment depth 2 to 200 meters below sea surface (varies depending on water depth)

h. Tow speed 3-4 Knots

i. Approximate length of cable tow 5-800 meters (varies depending on water depth)

Applicant's Representative:
Eddie Stutts
Fugro Pelagos Inc.
4820 McGrath St. Suite 100
Ventura, CA 93003
(805) 289-3891

California State Lands Representative
Richard B. Greenwood
Statewide Geophysical Coordinator
200 Oceangate, 12th Floor
Long Beach, CA 90802-4331
(562) 590-5201

BOEM Representative
Joan Barminski
Regional Supervisor
Office of Strategic Resources
770 Paseo Camarillo
Camarillo, CA 93010
(805) 389-7585

Other Federal Representative (if not BOEM):

LOCAL NOTICE TO MARINERS

Notice of Survey Operations

DEPARTMENT OF HOMELAND SECURITY
UNITED STATES COAST GUARD
COMMANDER, 11TH COAST GUARD DISTRICT
Building 50-2 Coast Guard Island
Alameda, CA 94501-5100
LNM Point of Contact
BM1 Alfred K Albert:
510-437-2980
D11lnm@uscg.mil

1. Name of Contractor:	***FUGRO***
2. Type of Operation:	***Side Scan Sonar Survey***
3. Location / Position Information:	***Long Beach, Offshore California (See Attached Map)***
4. Start and End Dates:	***Start: November 28, 2016, End: December 30, 2016***
5. Vessel(s) Involved (include FCC Call Sign):	***M/V John Henry***
6. Radio Yes / No, VHF Freq's Monitored:	***Yes, VHF 16***
7. Any other pertinent Info:	***The John Henry will be towing up to 3000 feet of cable astern of the vessel. Daylight operations will be conducted.***
8. POC Name & Telephone Number(s):	***Cindy Pratt or Eddie Stutts (Fugro) 805-650-7000***
9. Chart Number:	***18020***

SOUTHERN CALIFORNIA-SURVEY OPERATIONS
LONG BEACH, OFFSHORE CALIFORNIA

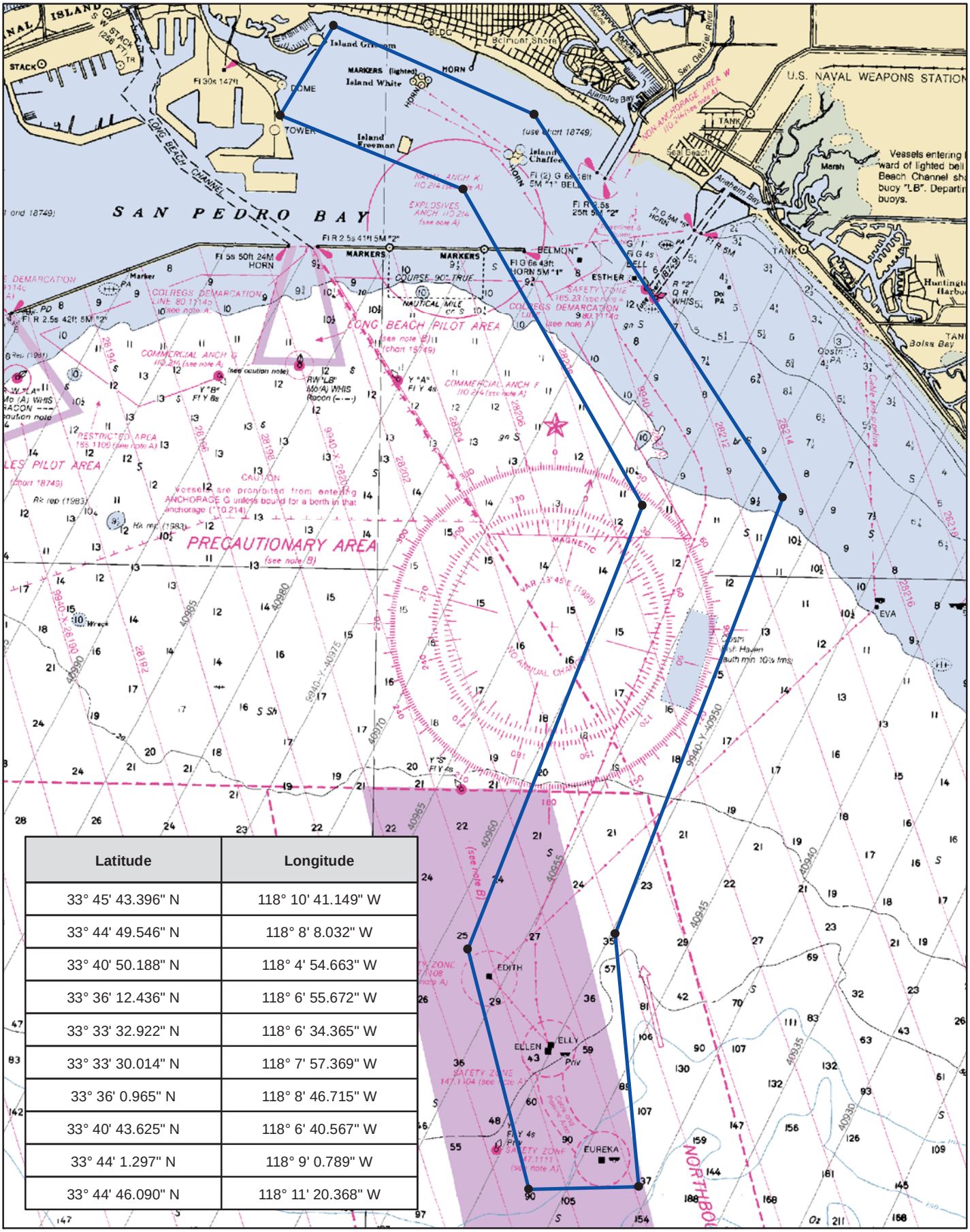
Fugro will be conducting a side scan sonar survey from the M/V John Henry in the area outlined on the attached portion of Chart 18020. Operations will last approximately 3-4 days and be carried out between November 28 to December 30, 2016 (daylight operations). The M/V John Henry will be towing up to 3000 feet of cable during mapping operations. The survey area is outlined by the following coordinates.

LATITUDE	LONGITUDE
33° 45' 43.396" N	118° 10' 41.149" W
33° 44' 49.546" N	118° 8' 8.032" W
33° 40' 50.188" N	118° 4' 54.663" W
33° 36' 12.436" N	118° 6' 55.672" W
33° 33' 32.922" N	118° 6' 34.365" W
33° 33' 30.014" N	118° 7' 57.369" W
33° 36' 0.965" N	118° 8' 46.715" W
33° 40' 43.625" N	118° 6' 40.567" W
33° 44' 1.297" N	118° 9' 0.789" W
33° 44' 46.090" N	118° 11' 20.368" W

The vessel will have limited maneuverability during operations and mariners are advised to use due caution when transiting in the area. For more details or comments contact Eddie Stutts or Cindy Pratt at 805-650-7000.

NOAA Nautical Chart 18020 with Proposed Survey Area

Side Scan Sonar Survey Notice
Offshore Long Beach, California



Latitude	Longitude
33° 45' 43.396" N	118° 10' 41.149" W
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33° 44' 46.090" N	118° 11' 20.368" W

Keen, Kelly@SLC

From: Pratt, Cynthia [FPI] <cpratt@fugro.com>
Sent: Sunday, November 06, 2016 3:49 PM
To: D11lnm@uscg.mil
Cc: Villegas, Bradi [FPI]
Subject: Local Notice to Mariners (Ref. 7200)
Attachments: 7200_Notice to Mariners.pdf

Good Afternoon, Alfred,

Attached is a local notice to mariners for an upcoming side scan sonar survey offshore Long Beach.

Please contact me if you have any questions or further requirements.

Kind regards,
Fugro Pelagos, Inc.

Cindy Pratt
Survey Operations Manager - Ventura

T +1 805 289 3807 I C +1 805 279 1138 cpratt@fugro.com I www.fugro.com
4820 McGrath Street, Suite 100, Ventura, CA 93003-7778, USA

Keen, Kelly@SLC

From: Pratt, Cynthia [FPI] <cpratt@fugro.com>
Sent: Monday, November 07, 2016 12:15 PM
To: community@portla.org; harbor@cityoflongbeachms.com
Cc: Villegas, Bradi [FPI]
Subject: Pre-survey notification - Harbor Masters (Ref. 7200)
Attachments: 7200_HarborMaster_DiveShops.pdf

Good Afternoon,

Per our geophysical notification requirements by California State Lands Commission (CSLC), I am submitting to you the attached notice for posting.

Please contact me if you have any questions or require further information.

Kind regards,
Fugro Pelagos, Inc.

Cindy Pratt
Survey Operations Manager – Ventura

T +1 805 289 3807 I C +1 805 279 1138
cpratt@fugro.com I www.fugro.com
4820 McGrath Street, Suite 100, Ventura, CA 93003-7778, USA

Keen, Kelly@SLC

From: Pratt, Cynthia [FPI] <cpratt@fugro.com>
Sent: Monday, November 07, 2016 12:16 PM
To: dive@ScubaDiveLA.com; scuba@ecodivecenter.com
Cc: Villegas, Bradi [FPI]
Subject: Pre-survey notification - Dive Shops (Ref. 7200)
Attachments: 7200_HarborMaster_DiveShops.pdf

Good Afternoon,

Per our geophysical notification requirements by California State Lands Commission (CSLC), I am submitting to you the attached notice for posting.

Please contact me if you have any questions or require further information.

Kind regards,
Fugro Pelagos, Inc.

Cindy Pratt
Survey Operations Manager – Ventura

T +1 805 289 3807 I C +1 805 279 1138
cpratt@fugro.com I www.fugro.com
4820 McGrath Street, Suite 100, Ventura, CA 93003-7778, USA

MARINE WILDLIFE CONTINGENCY PLAN

MARINE WILDLIFE CONTINGENCY PLAN

BETA OFFSHORE SIDE SCAN SONAR SURVEY OFFSHORE LONG BEACH, CALIFORNIA

Project No. 1602-3081

Prepared for:

Fugro Pelagos, Inc.
4820 McGrath St., Suite 100
Ventura, California 93003

Prepared by:

Padre Associates, Inc.
369 Pacific Street
San Luis Obispo, California 93401

October 2016

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

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FIGURES

APPENDICES

1.0 INTRODUCTION

This Marine Wildlife Contingency Plan (MWCP) has been developed for Fugro Pelagos, Inc. (Fugro), in support of the Beta Offshore (Beta) side scan sonar survey along existing pipeline routes, located offshore of Long Beach, California, in State and Federal waters within the Southern California Bight (Project). This MWCP has been prepared in accordance with the requirements in the existing California State Lands Commission (CSLC)-issued geophysical and geologic sampling permit No. 8391.9. This MWCP is designed to reduce or eliminate adverse impacts to marine wildlife resources within the survey areas.

This MWCP is specific to the geographic location, equipment, and activities that are proposed for the survey. The proposed monitoring and mitigations have been successfully used in agency-approved MWCPs for similar offshore surveys in California marine waters, and have been shown to be effective in reducing or eliminating potential impacts to marine mammals and turtles (marine wildlife).

1.1 PURPOSE AND OBJECTIVES

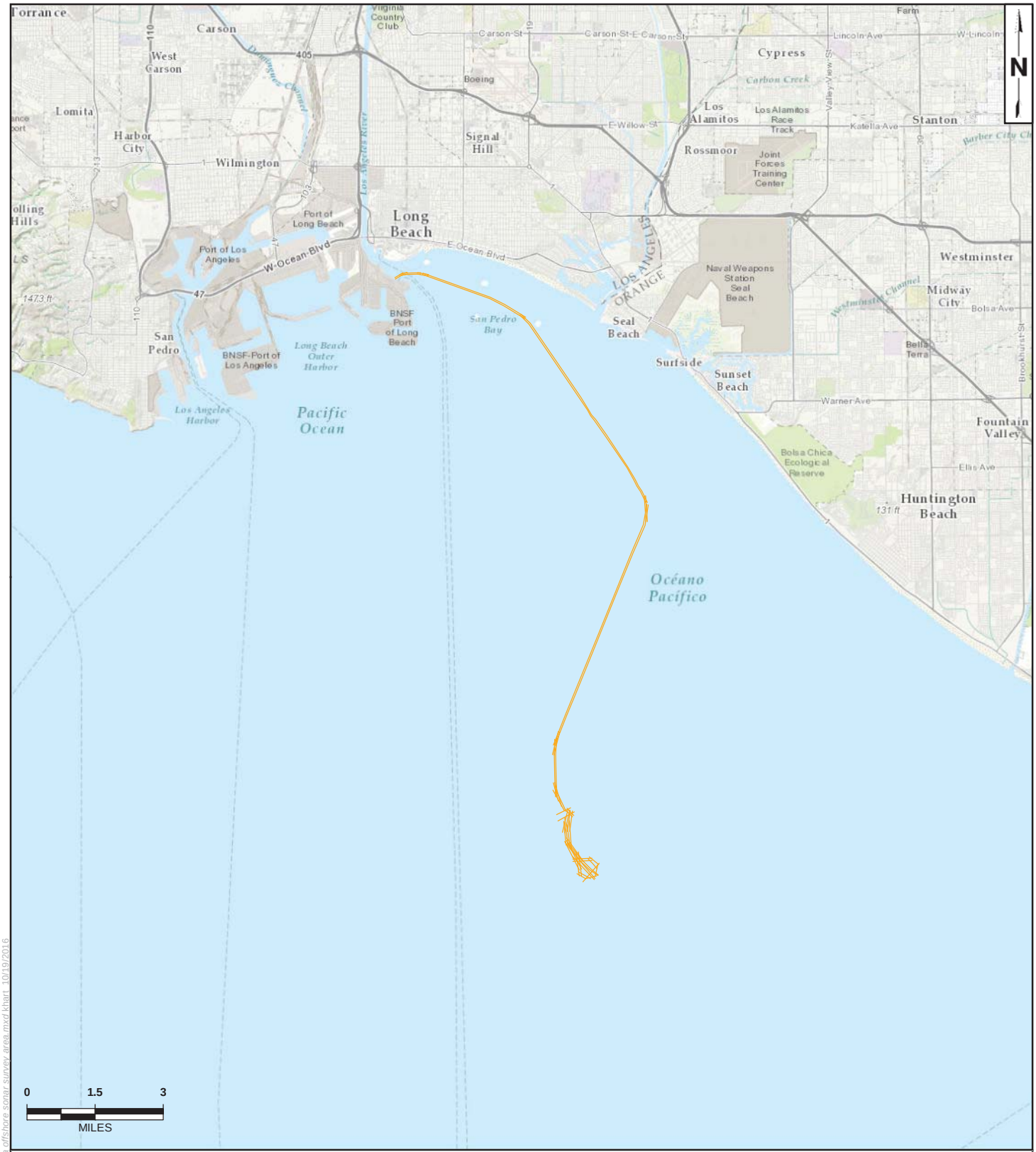
The proposed survey will utilize a side scan sonar system to inspect existing Beta oil/gas pipelines. The purpose of the side scan sonar survey will be acquire seafloor imaging of existing pipelines and document the seafloor conditions within the wide-swath area by locating scour marks, fluid vents, submarine landslides, fault scarps, trawl marks, pipeline spans, and man-made debris that might have an impact on pipeline or platform integrity. The surveys will also identify locations where pipelines are exposed and buried. The survey will be completed by Fugro in accordance with requirements specified in the Beta Project Work Plan.

1.2 PROPOSED AREA AND ACTIVITIES

The proposed survey is estimated to be completed in approximately four days. The survey area is located offshore Long Beach, California (Figure 1.2-1) and will take place in both State and Federal waters. Survey depths are estimated to range from 9 to 236 meters (m) (30 to 775 feet [ft]). The vessel will mobilize in Port of Long Beach, and will return to Port of Long Beach following the completion of the survey. Survey and transit will take place during daylight hours (no nighttime operations are proposed).

1.3 SURVEY EQUIPMENT

The survey will utilize the motor vessel (MV) *John Henry*, a 28 m (93 ft) vessel owned and operated by SoCal Ship Services. Survey equipment will include the Edgetech 4200 side scan sonar towfish with operating frequencies of 300 and 600 kilohertz (kHz).



LEGEND:

Proposed Runline

MAP EXTENT:

Source: ESRI Online Topo Map, NOAA
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet
Notes: This map was created for informational and display purposes only.

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

PROJECT NAME:
FUGRO BETA SIDE SCAN SONAR SURVEY
LOS ANGELES COUNTY, CA

PROJECT NUMBER: 1602-3081

DATE: October 2016

SURVEY AREA

FIGURE
1.2-1

Z:\Kristin\GIS Maps\Map Projects\Beta Offshore\Beta offshore sonar survey area.mxd khart 10/19/2016

2.0 MARINE WILDLIFE

Multiple species of marine turtles, cetaceans (whales, dolphins, and porpoises, pinnipeds (seals and sea lions), and fissipeds (sea otter) have been recorded along the southern California coast (Table 2.0-1). Most of the recorded species can occur within the survey region, although seasonal abundances of these taxa vary; pinnipeds and some dolphins are year-round residents (Table 2.0-2). Other species are migratory, such as the gray whale (*Eschrichtius robustus*), or seasonal, such as the blue and humpback whales (*Balaenoptera musculus* and *Megaptera novaeangliae*, respectively); therefore, are more abundant during specific months. Within the survey region, resident, seasonal, and migrant taxa could be expected to occur.

Table 2.0-1. Abundance Estimates for Marine Mammals and Reptiles within Southern California (California/Mexico Border to Point Conception)

Common Name *Scientific Name*	Population Estimate	Current Population Trend
REPTILES		
Cryptodira		
Olive Ridley turtle *Lepidochelys olivacea*	1.1 million (Eastern Tropical Pacific DPS)	Stable
Green turtle *Chelonia mydas*	20,112 (Eastern Pacific DPS)	Stable
Loggerhead turtle *Caretta caretta*	7,138 (California)	Decreasing
Leatherback turtle *Dermochelys coriacea*	361 (California)	Decreasing
MAMMALS		
Mysticeti		
California gray whale *Eschrichtius robustus*	18,017 (Eastern North Pacific Stock)	Fluctuating annually
Fin whale *Balaenoptera physalus*	2,598 (California/Oregon/Washington Stock)	Increasing off California
Humpback whale *Megaptera novaeangliae*	1,876 (California/Oregon/Washington Stock)	Increasing
Blue whale *Balaenoptera musculus*	1,551 (Eastern North Pacific Stock)	Unable to determine
Minke whale *Balaenoptera acutorostrata*	202 (California/Oregon/Washington Stock)	No long-term trends suggested
Northern Pacific right whale *Eubalaena japonica*	31 (based on photo-identification) (Eastern North Pacific Stock)	No long-term trends suggested
Sei whale *Balaenoptera borealis*	83 (Eastern North Pacific Stock)	No long-term trends suggested
Odontoceti		
Short-beaked common dolphin *Delphinus delphis*	343,990 (California/Oregon/Washington Stock)	Unable to determine
Long-beaked common dolphin *Delphinus capensis*	76,224 (California Stock)	Unable to determine
Dall's porpoise *Phocoenoides dalli*	32,106 (California/Oregon/Washington Stock)	Unable to determine
Pacific white-sided dolphin *Lagenorhynchus obliquidens*	21,406 (California/Oregon/Washington Northern and Southern Stock)	No long-term trends suggested
Risso's dolphin *Grampus griseus*	4,913 (California/Oregon/Washington Stock)	No long-term trends suggested

Table 2.0-1. Abundance Estimates for Marine Mammals and Reptiles within Southern California (California/Mexico Border to Point Conception)

Common Name *Scientific Name*	Population Estimate	Current Population Trend
Short-finned pilot whale *Globicephala macrorhynchus*	465 (California/Oregon/Washington Stock)	No long-term trends suggested
Striped dolphin *Stenella coeruleoalba*	8,231 (California, Oregon, Washington)	No long-term trends suggested
Baird's beaked whale *Berardius bairdii*	466 (California, Oregon, Washington)	No long-term trends suggested
Cuvier's beaked whale *Ziphius cavirostris*	4,481 (California, Oregon, Washington Stock)	No long-term trends suggested
Mesoplodont beaked whales	389 (California, Oregon, Washington)	No long-term trends suggested
Bottlenose dolphin *Tursiops truncatus*	684 (California/Oregon/Washington Offshore Stock)	No long-term trends suggested
	290 (California Coastal Stock)	No long-term trends suggested
Northern right whale dolphin *Lissodelphis borealis*	6,019 (California/Oregon/Washington Stock)	No long-term trends suggested
Sperm whale *Physeter macrocephalus*	751 (California/Oregon/Washington Stock)	No long-term trends suggested
Dwarf sperm whale *Kogia sima*	Unknown (California, Oregon, Washington)	No long-term trends suggested
Pygmy sperm whale *Kogia breviceps*	271 (California/Oregon/Washington Stock)	No long-term trends suggested
Killer whale *Orcinus orca*	162 (Eastern North Pacific Offshore Stock) 354 (West Coast Transients)	No long-term trends suggested
Pinnipedia		
California sea lion *Zalophus californianus*	153,337 (U.S. Stock)	Unable to determine; increasing in most recent three year period
Northern fur seal *Callorhinus ursinus*	6,431 (California - San Miguel Island Stock)	Increasing
Guadalupe fur seal *Arctocephalus townsendi*	3,028 (Mexico Stock) Undetermined in California	Increasing
Northern elephant seal *Mirounga angustirostris*	74,913 (California Breeding Stock)	Increasing
Pacific harbor seal *Phoca vitulina richardsi*	26,667 (California Stock)	Stable
Fissipedia		
Southern sea otter *Enhydra lutris nereis*	3,272	Unable to determine

Source: Allen, 2011; NMFS, 2015a,b; and Tinker and Hatfield, 2016.
* Estimates are based on known data of the population of nesting females for eastern Pacific Distinct Population Segments.

Table 2.2-1. California Marine Wildlife Species and Periods of Occurrence within Southern California (California/Mexico Border to Point Conception)

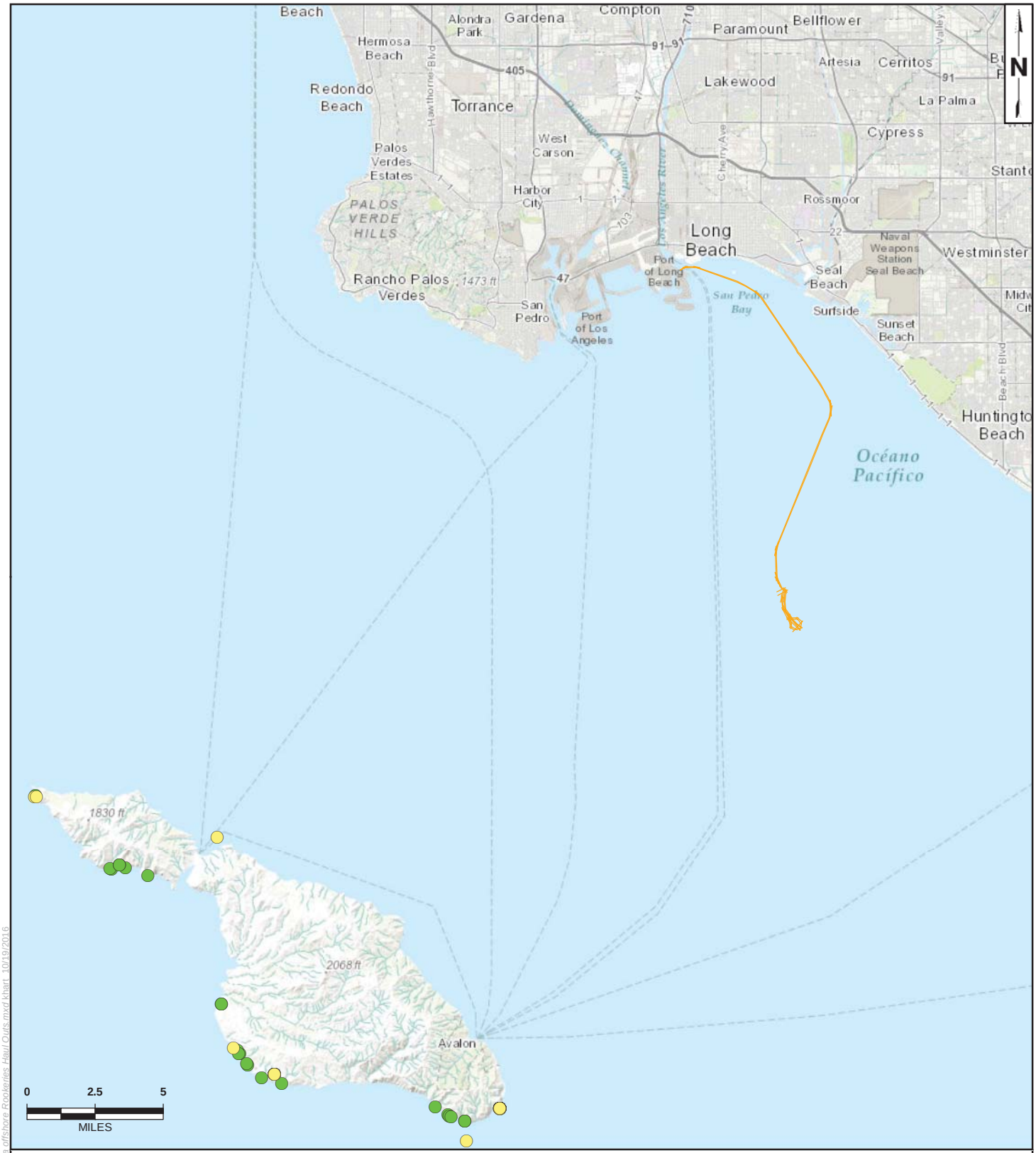
Family Common Name	Month of Occurrence [1] J	F	M	A	M	J	J	A	S	O	N	D
REPTILES												
Cryptodira												
Olive ridley turtle (T)[2]												
Green turtle (T)[2]												
Leatherback turtle (E)[2]												
Loggerhead turtle (T)[2]												
MAMMALS												
Mysticeti												
California gray whale												
Blue whale (E)												
Fin whale (E)												
Humpback whale (E)												
Minke whale												
Sei whale (E)												
Northern right whale (E)												
Odontoceti												
Dall's porpoise												
Short-beaked common dolphin												
Long-beaked common dolphin												
Pacific white-sided dolphin												
Risso's dolphin												
Short-finned pilot whale												
Bottlenose dolphin												
Northern right whale dolphin												
Sperm whale												
Dwarf sperm whale												
Pygmy sperm whale												
Baird's beaked whale												
Cuvier's beaked whale												
Mesoplodont beaked whales												
Killer whale												
Pinnipedia												
Northern fur seal[3]												
Guadalupe fur seal												
California sea lion												
Northern elephant seal[4]												
Pacific harbor seal												
Fissipedia												
Southern sea otter (T)[5]												

Rare with uniform distribution | Not expected to occur due to seasonal distribution | More likely to occur due to seasonal distribution | Present Year Round

(E) Federally listed endangered species.
(T) Federally listed threatened species.
(1) Where seasonal differences occur, individuals may also be found in the "off" season. Also, depending on the species, the numbers of abundant animals present in their "off" season may be greater than the numbers of less common animals in their "on" season.
(2) Only a small percent occur over continental shelf (except near San Miguel rookery, May-November).
(3) Common near land during winter breeding season and spring molting season.
(4) Only nearshore (diving limit 100 feet).

2.1 PINNIPED HAUL-OUTS AND ROOKERIES

The proposed Project activities will not occur near any known pinniped haul-out and/or rookeries (Figure 2.1-1). The closest haul-out/rookery is located approximately 33 kilometers (km) (20.53 miles [mi]) southeast of the survey area.



LEGEND:

Proposed Runline

Pinniped Haul Outs by Species:

California sea lion

Harbor seal

MAP EXTENT:

Source: ESRI Online Topo Map, NOAA
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet
Notes: This map was created for informational and display purposes only.

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

PROJECT NAME:
FUGRO BETA SIDE SCAN SONAR SURVEY
LOS ANGELES COUNTY, CA

PROJECT NUMBER: 1602-3081

DATE: October 2016

PINNIPED HAUL-OUTS AND ROOKERIES

FIGURE
2.1-1

Z:\Kristin\GIS Maps\Map Projects\Beta_Offshore\Beta_offshore Rookeries Haul Outs.mxd klhart 10/19/2016

3.0 MARINE PROTECTED AREAS

Proposed survey activities will not occur within any Marine Protected Areas (MPA). Survey area is located approximately four km (2.71 mi) west of the Bolsa Chica Basin State Marine Conservation Area (Figure 3.0-1).

LEGEND:

Proposed Runline

Marine Protected Area (MPA)

MAP EXTENT:

Source: ESRI Online Topo Map, NOAA
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet
Notes: This map was created for informational and display purposes only.

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PROJECT NAME:
FUGRO BETA SIDE SCAN SONAR SURVEY
LOS ANGELES COUNTY, CA

PROJECT NUMBER: 1602-3081

DATE: October 2016

MARINE PROTECTED AREAS

FIGURE 3.0-1

Z:\Kristin\GIS Maps\Map Projects\Beta_Offshore\Beta_offshore MPA mxd khart 10/19/2016

4.0 ONBOARD MONITORING AND OTHER MITIGATIONS

4.1 PRE-SURVEY NOTIFICATIONS

A Notice to Mariners will be submitted to the United States Coast Guard (USGS), and all applicable agencies, prior to the start of the survey. The Notice to Mariners will provide information regarding proposed activities and coordinates of the survey location. In addition, Furgo will notify the local harbormasters' office and dive shops prior to the start of survey activities.

Three days prior to the initiation of the survey, Padre marine scientists will contact National Oceanic and Atmospheric Administration (NOAA) Fisheries Long Beach office staff and local private whale-watching operations to acquire information on the recently-observed composition and relative abundance of marine wildlife in the survey area. That information will be conveyed to the vessel crew and survey team prior to departure for the survey area.

4.2 MARINE WILDLIFE MONITORS

Two qualified marine wildlife monitors (MWM), approved by NOAA Fisheries (refer to Appendix A for monitor qualifications), will be onboard the vessel for the duration of the survey. In accordance with the CSLC-issued geophysical and geologic sampling permit, one MWM will be monitoring during transit and survey activities within State waters. Monitors will rotate shifts throughout the day during survey activities.

4.3 VESSEL TRANSIT

Following mobilization, the survey vessel will transit from Port of Long Beach to the survey area and return following the completion of the survey. During vessel transit to and from the survey area and between survey locations, there is a potential for encountering marine wildlife and therefore onboard monitoring will occur.

During transit periods, the MWM will be positioned on the vessel so that he/she has a clear view of the area of ocean that is in the direction of the course of travel. The MWM will identify marine wildlife and will institute measures to avoid potential collisions with those animals. To minimize the chance of collision with or disturbance, the vessel will maintain a minimum distance of 91 m (300 ft) from marine wildlife. If the MWM observes an animal within the path of the transiting vessel, the MWM will immediately report that observation to the vessel operator who will, unless those actions will jeopardize the safety of the vessel or crew, slow the vessel and/or change course in order to avoid contact.

When whales are in the survey area and/or are observed proximal to the vessel during transit periods the vessel operator will observe the following guidelines:

- Maintain a minimum distance of 100 m (330 ft) from sighted whales;
- Refrain from crossing directly in front of or across the path of sighted whales;

- Transit parallel to whales and maintain a constant speed that is not faster than the whale's speed;
- Avoid positioning the vessel in such a manner to separate a female whale from her calf;
- Do not use the vessel to herd or drive whales; and
- If a whale engages in evasive or defensive action, slow the vessel and move away from the animal until the animal calms or moves out of the area.

4.4 FISHING GEAR CLEARANCE

In addition to submitting the required Notice to Mariners that will alert commercial fishers of pending survey activities, the vessel will traverse the proposed survey corridor to note and record the presence of deployed fishing gear. If fishing gear is observed, the location of fishing gear (buoys) and license number indicated on the gear will be noted, and the California Department of Fish and Wildlife (CDFW) Southern District Enforcement Office will be contacted. No survey lines will be completed within 30 m (100 ft) of any observed fishing gear. The survey crew will not remove or relocate any fishing gear; removal or relocation will only be accomplished by the owner or by an authorized CDFW agent (Table 4.4-1).

Table 4.4-1. Fishing Gear Contact Information

Enforcement Dispatch Desk California Department of Fish and Wildlife, Southern District	California Department of Fish and Wildlife, Marine Division	Joint Oil Fisheries Liaison Office (JOFLO)
(562) 598-1032	(831) 649-2870	(805) 963-8819

4.5 SURVEY MONITORING AND MITIGATION MEASURES

During the data collection efforts, the MWM will use binoculars to observe the water surface in the general survey area while located at a high vantage point onboard the survey vessel. As specified in the CSLC-issued geophysical and geologic sampling permit, surveys utilizing equipment with an operating frequency greater than 200 kHz will not require a designated safety zone. The MWM will have the authority to recommend halting data collecting operations if marine wildlife is observed reacting negatively to the survey-related activities.

The MWM will also have the authority to recommend continuation or cessation of operations during periods of limited visibility based on the observed abundance of marine wildlife. Periodic reevaluation of weather conditions and reassessment of the continuation/cessation recommendation will be completed by the MWM. With the incorporation of these measures and additional mitigation measures listed below, the proposed survey activities have a low potential of injury and/or disturbance to marine wildlife. The following operation-related actions will be implemented in accordance with CSLC permit requirements:

1. Survey operator shall use a “soft start” technique at the beginning of survey activities each day (or following a shutdown) to allow any marine mammal that may be in the Project area to leave before the sound sources reach full energy. The survey operator will initiate each piece of equipment at the lowest practical sound level, increasing the output no greater than six decibels (dB) per five-minute period;

2. During operations, if an animal’s actions are observed to be “irregular” the MWM will have the authority to recommend the cessation of data collection until the animal moves out of the survey Area. If the behavior is observed, the equipment will be shut-off and will be restarted and ramped-up to full power or will not be started until the animal(s) is/are outside of the survey area;

3. The MWM will have the authority to recommend halting data collecting operations if a large concentration of diving birds/sea birds is observed in the immediate vicinity;

4. Unless the safety of the vessel or crew would be in jeopardy, avoidance measures instituted during vessel transit will also be implemented during geophysical data collection; and

5. Survey operator shall follow, to the maximum extent possible, the guidelines of Zykov (2013) as they pertain to the use of side-scan sonar, including:

    a) Using the shortest possible pulse length; and

    b) Lowering the pulse rate (pings per second) as much as feasible.

5.0 RECORDING AND REPORTING PROCEDURES

5.1 OBSERVATION RECORDING

The MWM will record observations on pre-printed forms and will photo-document observations whenever possible. The completed forms will be used as the primary data sources for the post-survey report (see Section 5.3 below) which will be provided to the CSLC and/or other agencies, if requested.

5.2 COLLISION RESPONSE

The Marine Mammal Protection Act (MMPA) requires that collisions with or other survey-related impacts to marine wildlife will be reported promptly to the National Marine Fisheries Service (NMFS) Stranding Coordinator.

If a collision or impacts to marine wildlife occurs, the vessel should stop, if safe to do so. However, the vessel is not obligated to stand by and may proceed after confirming that it will not further damage the animal by doing so. The vessel will then communicate by radio or telephone all details to the vessel's base of operations (Table 5.2-1).

Table 5.2-1. Collision Contact Information

Federal	State	State
Justin Viezbicke Stranding Coordinator National Marine Fisheries Service Long Beach, California (562) 980-3230	Enforcement Dispatch Desk California Department of Fish and Wildlife Los Alamitos, California (562) 598-1032	California State Lands Commission Division of Environmental Planning and Management Sacramento, California (916) 574-1938

The vessel operator, with guidance from the MWM, must document the conditions under which the accident occurred, including the following:

- Location (latitude and longitude) of the vessel when the collision occurred;
- Date and time of collision;
- Speed and heading of the vessel at the time of collision;
- Observation conditions (e.g., wind speed and direction, swell height, visibility in miles or kilometers, and presence of rain or fog) at the time of collision;
- Species of marine wildlife contacted (if known);
- Whether a MWM was observing for marine wildlife at the time of collision; and
- Name of vessel, vessel owner/operator (the company), and captain or officer in charge of the vessel at time of collision.

It is unlikely that the vessel will be asked to stand by until NMFS or CDFW personnel arrive; however, this will be determined by the NMFS Stranding Coordinator. According to the MMPA, the vessel operator is not allowed to aid injured marine wildlife or recover the carcass unless requested to do so by the NMFS Stranding Coordinator.

Although NMFS has primary responsibility for marine mammals in both State and Federal waters, the CDFW will also be advised that an incident has occurred in State waters affecting a protected species.

5.3 MONITORING REPORT

A technical report will be prepared documenting the Project activities, a summary of observations and any encounters with marine wildlife, and subsequent avoidance actions taken during the survey. The report will be submitted to Fugro within two weeks of completion of field data collection. Fugro will then submit the monitoring report to the appropriate agencies.

6.0 REFERENCES

Allen, S., Mortenson, J., and Webb, S.. 2011. Field Guide to Marine Mammals of the Pacific Coast: Baja, California, Oregon, Washington, British Columbia. University of California Press. Berkeley and Los Angeles, California.

Bonnell, M.L., and Dailey, M.D.. 1993. Ecology of the Southern California Bight: A Synthesis and Interpretation. Berkeley, CA: University of California Press.

National Marine Fisheries Service. 2016a. Marine Mammal Stock Assessment Reports by Species. Website: http://www.nmfs.noaa.gov/pr/sars/species.htm. Updated June 17, 2016 accessed on August 10, 2016.

National Marine Fisheries Service 2016b. Status of Marine Turtles Website: http://www.fisheries.noaa.gov/pr/species/turtles/ Updated April 5, 2015 accessed on August 10, 2016.

NOAA National Centers for Coastal Ocean Science (NCCOS). 2007. A Biogeographic Assessment off North/Central California: In Support of the National Marine Sanctuaries of Cordell Bank, Gulf of the Farallones and Monterey Bay. Phase II - Environmental Setting and Update to Marine Birds and Mammals. Prepared by NCCOS's Biogeography Branch, R.G. Ford Consulting Co. and Oikonos Ecosystem Knowledge, in cooperation with the National Marine Sanctuary Program. Silver Spring, MD. NOAA Technical Memorandum NOS NCCOS 40. 240 pp.

Tinker, M.T., and Hatfield, B.B. 2016. California sea otter (*Enhydra lutris nereis*) census results, spring 2016: U.S. Geological Survey Data Series 1018, 10 p., http://dx.doi.org/10.3133/ds1018.

Zykov, M. 2013. Underwater Sound Modeling of Low Energy Geophysical Equipment Operations. JASCO document 00600, Version 2.0. Technical Report by JASCO Applied Sciences for CSA Ocean Sciences Inc.

APPENDIX A

MARINE WILDLIFE MONITOR RESUMES

Resume

Jennifer Klaib

Project Biologist/Marine Biologist

EDUCATION: B.S. Aquatic Biology, University of California, Santa Barbara, 2006

EXPERIENCE: Ms. Klaib joined Padre Associates, Inc. in 2006 and has over 10 years of experience in environmental assessment of coastal and offshore development projects, monitoring of construction impacts on marine resources, and permitting of coastal projects. Ms. Klaib is responsible for biological surveys, permit compliance monitoring, contingency plans, permit applications, environmental sensitivity trainings, sensitive species surveys, water quality sampling, and wildlife rescue and relocation. In addition, Ms. Klaib is experienced in regulatory agency permitting involving the National Marine Fisheries Service (NMFS), California Coastal Commission (CCC), California State Lands Commission (CSLC), Army Corps of Engineers (ACOE), Regional Water Quality Control Board (RWQCB), California Department of Fish and Wildlife (CDFW), and various local planning agencies throughout California.

Ms. Klaib has over 11 years of offshore monitoring experience and is a National Oceanic and Atmospheric Administration (NOAA) Fisheries-qualified marine mammal monitor. Ms. Klaib was responsible for monitoring the effects on marine mammals and turtles during geophysical surveys and construction projects throughout the California coast. Ms. Klaib has also worked with agencies to design and implement Aerial Monitoring Plans, to monitor the distribution of cetaceans, pinnipeds, and turtles offshore of central California. Ms. Klaib has participated in aerial surveys where she observed and recorded species, location, and abundance of cetaceans, pinnipeds, and turtles offshore of California.

In addition, Ms. Klaib is an American Academy of Underwater Sciences (AAUS) certified research diver and has over 200 logged dives conducting biological surveys offshore of California. She has experience in designing and implementing scientific dive plans for habitat assessments, eelgrass mapping, anchor clearance, *Caulerpa* surveys, and pre- and post-project impact studies.

Representative projects Ms. Klaib has managed or assisted with include:

Fugro Pelagos, Inc. Low-Energy Marine Geophysical Surveys, Offshore California. Ms. Klaib has been the Padre Project Manager and has been responsible for marine wildlife monitoring and reporting for surveys conducted by Fugro Pelagos, Inc. (Fugro) throughout coastal California. She has completed numerous Marine Wildlife contigency Plans (MWCPs) in accordance to Fugro's CSLC issued geophysical permit. Ms. Klaib has been onboard various survey vessels recording mammal and turtle sightings and assuring that potential impacts were avoided. Ms. Klaib has completed these plans and provided monitoring services for Fugro projects that ranged from one-day bathymetry surveys to multi-week low-energy geophysical data collection efforts.

Cayucos Pier Restoration Project, San Luis Obispo County, California. Ms. Klaib was the Project Manager and was responsible for marine wildlife and water

quality monitoring during the demolition and reconstruction of the Cayucos Pier. Water quality monitoring included conducting daily baseline monitoring one week prior to and providing weekly monitoring during construction activities that included analyzing water samples for turbidity, dissolved oxygen, pH, and conducting visual assessments for floating particulates. Ms. Klaib conducted marine wildlife monitoring during pile driving operations to mitigate for potential noise impacts to marine mammals and sea turtles. In addition, Ms. Klaib prepared final project completion reports for the County of San Luis Obispo.

PG&E Point Buchon Ocean Bottom Seismometer Project, Offshore San Luis Obispo County, California State Waters. Ms. Klaib was responsible for monitoring marine wildlife during the placement and recovery of ocean bottom seismometer offshore San Luis Obispo County in 2011 through 2016. In support of the project, Ms. Klaib prepared a Marine Wildlife Contingency Plan and submitted survey completion reports to National Marine Fisheries Service (NMFS) and California State Lands Commission (CSLC).

CERTIFICATIONS, PERMITS AND TRAINING:

American Academy of Underwater Sciences (AAUS) Scientific Diver. September 2003.

National Association of Underwater Instructors (NAUI) Master SCUBA Diver. September 2003.

Standards of Training Certifications and Watchkeeping (STCW) Certified Personal Survival Techniques, Cal Maritime Academy. February 2016

Passive Acoustic Technician. October 2014

National Marine Fisheries Service and California Department Fish and Wildlife Certified Caulerpa Survey Specialist since 2008

Guadalupe Dunes Restoration Project Biological Opinion. Ms. Klaib is authorized to independently monitor, survey, handle and relocate California Red-Legged frogs (CRLF).

San Simeon Creek Bridges Replacement Project Biological Opinion. Ms. Klaib is authorized to independently monitor, survey, handle and relocate California Red-Legged frogs (CRLF).

California Red-Legged Frog Biology and Conservation Workshop. April 2010.

California Red-legged Frog Natural History Training, Guadalupe Oil Field Restoration Project, Guadalupe, CA. November, 2010.

Resume

Michaela Hoffman

Project Marine Biologist

EDUCATION: B.S. Biology with a Concentration in Marine Science and Fisheries, California Polytechnic State University, San Luis Obispo, 2009

EXPERIENCE: Ms. Hoffman joined Padre in 2011 and has five years of experience as a field biologist. Ms. Hoffman's focus has been primarily in aquatic and marine biology. During her time at Padre, Ms. Hoffman has acquired enough sea-time as a marine wildlife monitor to be an approved Protected Species Observer by the National Oceanic and Atmospheric Administration (NOAA). Ms. Hoffman is responsible for mitigation monitoring of protected terrestrial and marine species, preparing support documents for environmental permit applications, preparing wildlife contingency plans, conducting biological resource surveys and habitat assessments, conducting protocol-level surveys for protected species, and implementing restoration plans. Ms. Hoffman's field experience extends to both onshore and offshore construction projects, as well as numerous remediation and restoration sites.

Representative projects Ms. Hoffman has participated in include:

San Luis Obispo Tank Farm Remediation, Restoration, and Development Project, San Luis Obispo County, California. In support of the Biological Assessment for the project, Ms. Hoffman participated in several protocol-level surveys for both state and federally protected species including, California Red-legged frog (*Rana draytonii*), burrowing owl (*Athene cunicularia hypugaea*), and large vernal pool branchiopods (*Branchinecta* sp., *Streptocephalus* woottoni, *Lepidurus packardi*). In addition, Ms. Hoffman managed the Surface Hydrocarbon Inspection and Monitoring Program for two years which consisting of weekly surveys for oiled wildlife, and if found, the rescue and recovery of oiled wildlife under the guidance of the California Department of Fish and Wildlife (CDFW). In support of operational maintenance on the project site, Ms. Hoffman conducts on-going, seasonal nesting bird surveys and biological clearances for sensitive and protected species.

Point Buchon Ocean Bottom Seismometer Project, Offshore San Luis Obispo County, California State Waters. Ms. Hoffman was responsible for monitoring marine wildlife during the seismic geophysical surveys and ocean bottom seismometer deployments offshore San Luis Obispo County in 2011 through 2015. In support of the project, Ms. Hoffman prepared a Marine Wildlife Contingency Plan and submitted survey completion reports to National Marine Fisheries Service (NMFS) and California State Lands Commission (CSLC).

Cayucos Pier Restoration Project, San Luis Obispo County, California. Ms. Hoffman was responsible for marine wildlife and ocean water quality monitoring during the demolition and reconstruction of the Cayucos Pier. Ms. Hoffman conducted marine wildlife monitoring during pile driving operations to mitigate for potential noise impacts to marine mammals and sea turtles. In addition, Ms. Hoffman prepared final project completion reports for the County of San Luis

Obispo.

San Ardo Oil Field Biological Constraints Analysis, Monterey County, California. In support of the project biological resources analysis, Ms. Hoffman conducted U.S. Fish and Wildlife Service (USFWS) protocol-level surveys for California red-legged frog and vernal pool branchiopods.

Offshore Power System Reliability Project B, Santa Barbara Channel, California State and U.S. Federal Waters. Ms. Hoffman participated in environmental compliance monitoring during the recovery and deployment of replacement power cable along the ocean floor within the Santa Ynez offshore field unit. In support of the project, Ms. Hoffman prepared a Marine Wildlife Monitoring and Contingency Plan, including protections for marine mammals, reptiles and pelagic birds.

CERTIFICATIONS, PERMITS AND TRAINING:

American Academy of Underwater Sciences (AAUS) Scientific Diver. September 2015.

National Association of Underwater Instructors (NAUI) Master SCUBA Diver. September 2015.

Divers Alert Network (DAN) CPR/AED and First Aid and Emergency Oxygen Administration for Diving Accidents Certified, September 2015.

Standards of Training Certifications and Watchkeeping (STCW) Certified Personal Survival Techniques, Cal Maritime Academy, September 2011

Certified SCUBA Diver, PADI December 2008

Guadalupe Dunes Restoration Project Biological Opinion. Ms. Hoffman is authorized to independently monitor, survey, handle and relocate California Red-Legged frogs (CRLF) within the Guadalupe Oil Field Remediation and Restoration Project.

USFWS Endangered Species Act 10(a)(1)(A) Recovery Permit authorizing the take federally protected vernal pool branchiopods in conjunction with surveys for the purpose of enhancing their survival.

California Red-Legged Frog Workshop, presented by Trish Tartarian, May 2014.

Western Burrowing Owl Workshop, presented by Dr. Lynn Trulio, July 2014.

Fairy Shrimp of California Identification Course, presented by Mary S. Belk March 2013.

Taxonomy and Ecology of Branchiopods of California and Oregon, presented by Christopher Rogers, December 2012.

PROFESSIONAL AFFILIATIONS:

California Central Coast Chapter of the Wildlife Society, member.

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

Resume

Patrick R. Crooks

Staff Environmental Specialist

EDUCATION: B.S. Environmental Science, Ferrum College, Ferrum, Virginia, 2009

QUALIFICATIONS: Environmental Specialist

EXPERIENCE: Mr. Crooks joined Padre Associates, Inc. in 2010. As a Staff Environmental Specialist, his work focuses on permitting assistance and environmental monitoring to ensure project compliance with permit conditions promulgated by regulatory agencies and mitigating measures developed during project compliance with the California Environmental Quality Act and the National Environmental Policy Act. Mr. Crooks has also assisted with the implementation of post-construction restoration and mitigation plans, environmental sensitivity trainings, and sensitive species surveys. Mr. Crooks has over 5 years of offshore monitoring experience and is a National Oceanic and Atmospheric Administration (NOAA) Fisheries-approved marine wildlife monitor.

Representative projects Mr. Crooks has worked on include the following:

Beta Offshore – Pipeline Replacement Project - Environmental Assessment (EA) – Environmental Compliance – Marine Mammal Observation. Mr. Crooks assisted in preparing revisions to previous Environmental Assessment (EA) submittals to the Bureau of Safety and Environmental Enforcement (BSEE) and the Bureau of Ocean Energy Management (BOEM) including development of a Compliance Monitoring Plan incorporating all conditions of approval. Mr. Crooks then provided offshore support to Beta Offshore onboard the Project vessel *Intrepid* as a compliance monitor and marine mammal observer. Subsequently, Mr. Crooks assisted in the development of the Final Project Completion Reports, Final Compliance Monitoring Plan and Supporting Documentation, which were submitted to BSEE and BOEM to document successful completion of the Project.

DCOR – Pipelines Replacement Project – Environmental Assessment – Environmental Compliance – Marine Mammal Observation. Mr. Crooks assisted in the revisions to previous EA submittals to BSEE and BOEM including development of a Compliance Monitoring Plan incorporating all conditions of approval. Mr. Crooks then provided offshore support to DCOR onboard the Project vessel *Intrepid* as a compliance monitor and marine mammal observer. Subsequently, Mr. Crooks assisted in the development of the Compliance Monitoring Report and Supporting Documentation, which were submitted to BSEE and BOEM to document successful completion of the Project.

ExxonMobil/Fugro West, Inc. – Santa Ynez Unit – Marine Mammal Observation. Mr. Crooks provided marine mammal monitoring services for ExxonMobil and Fugro West, Inc. aboard the Project vessel the *Toby Tide* during side scan sonar surveys.

Beta Offshore – Platform Edit to Platform Elly Power Cable Project – Environmental Assessment (EA) – Environmental Compliance – Marine Mammal Observation. Mr. Crooks assisted in preparing revisions to previous EA submittals to BSEE and BOEM including development of a Compliance Monitoring Plan integrating all conditions of approval. Mr. Crooks then provided offshore support to Beta Offshore onboard the project vessel, Barge 185-3 (operated by L-3 MariPro), as a compliance monitor and marine mammal observer. Subsequently, Mr. Crooks assisted in the development of the Final Project Completion Reports, Final Compliance Monitoring Plan and Supporting Documentation, which were submitted to BSEE and BOEM to document the successful completion of the Project.

California State Lands Commission (CSLC) – Santa Barbara Channel Hazards Removal Program – Environmental Compliance. Mr. Crooks coordinated removal efforts with CSLC staff, provided recommendations, evaluated current site conditions related to hazards, and reviewed permit restrictions related to timing prior to in-field mobilization. Mr. Crooks documented environmental compliance during removal activities that took place during winter and spring low-tide cycles (winter season of 2011 through spring of 2016). Along with daily field observations, Mr. Crooks verified adherence to the Project's IS/MND, conditions of approval, permit conditions, and the Mitigation Monitoring Program (MMP) associated with the Project. Following the completion of work at specific sites a Project Progress Summary was prepared for CSLC. Mr. Crooks worked in the field alongside and at the direction of CSLC staff, regularly communicating and providing recommendations to their staff. Additionally, Mr. Crooks provided pre-Project environmental sensitivity trainings to all Project personnel.

TRAINING AND CERTIFICATIONS:

OSHA 40-Hour HAZWOPR and Yearly 8-Hour Refresher Course

8-Hour CPR and First Aid Training

Certified SCUBA Diver (NAUI, 2011)

Chevron Business Partner Safety Orientation and Overhead Power Lines Training

Chevron Safe Work Practice Training – Person Leading Work (PLW)

STCW Basic Safety Training in Personal Survival Techniques

Smith System Defensive Driving Course On-Road Format

CEQA Workshop 2011 Update

California Oil Producers Contractor Safety Orientation

Marine Mammal Monitoring Training (internal Padre training)

DCOR Platform Orientation and Swing Rope Training

Passport Card – Requisite Safety Training

Workplace Fire Safety Training

OIL SPILL CONTINGENCY PLAN

FUGRO
2016 ON-BOARD SPILL CONTAINMENT AND CLEAN-UP PLAN

THIS PLAN IS FOR FUGRO PERSONNEL TO READ *BEFORE* A SPILL OCCURS --AND TO KEEP HANDY FOR REFERENCE DURING AN EMERGENCY.

➧ **THE KEY TO SPILL PROTECTION IS *EARLY* RESPONSE AND ACTION.**

THIS PLAN IS FOR ALL EMPLOYEES ON A VESSEL OR BARGE. IT OUTLINES THE COMPANY PRIORITIES, THE LOCATION OF SPILL RESPONSE EQUIPMENT, INSTRUCTIONS ON HOW TO RESPOND, DIRECTIONS TO EMERGENCY MEDICAL FACILITIES, AND NOTIFICATION NAMES AND PHONE NUMBERS.

SPILL RESPONSE

PRIORITIES

In the event of a spill, on-site personnel are in the best position to take prompt action to minimize and control the spill.

Our company priorities are:

1. Personnel Safety
2. Prevention of Fire or Explosion
3. Elimination of Spill Source
4. Containment of the Spill
5. Collection and Storage of Contaminated Debris and Materials
6. Notification of Spillage
7. Preparation of Reports

SAFETY OF PERSONNEL IS ALWAYS OUR FIRST PRIORITY.

SPILL RESPONSE MEASURES

In case of an actual spill, take the following actions IF IT IS SAFE TO DO SO:

Call 911 for medical or fire emergency assistance if needed

Isolate and administer to injured persons if necessary

TAKE NECESSARY STEPS TO REDUCE THE RISK OF FIRE

- Turn off equipment, valves, or pumps
- Turn off or extinguish any sources of hot surfaces or flame

STOP SPILL AT SOURCE IF SAFE AND POSSIBLE

- Stop equipment leaks by crimping hoses, plugging holes, or isolating parts
- Upright turned over oil/grease or paint buckets
- Stop tank leaks by placing in additional containment or plugging hole

CONTAIN ON-DECK SPILL FROM SPREADING OVERBOARD

- Berm around spreading spill with absorbent material(rags, kitty litter, sock boom, etc)
- Apply granular absorbent("kitty litter") in sufficient quantity to soak up entire spill
- Wipe small spills with cotton rags

CONTAIN WATER-BORNE SPILLS TO AS SMALL AN AREA AS POSSIBLE

- Apply absorbent pads to spilled material
- Deploy oil boom/absorbent sock boom

➧ **IF SPILL IS LARGE, CALL THE FUGEO SUPERINTENDENT OR VICE PRESIDENT AS SOON AS POSSIBLE.**

➧ **<u>FOR IMMEDIATE DEPLOYMENT OF LARGE OIL BOOM</u>, CALL ONE OF THE FOLLOWING COMPANIES.**

- Clean Seas, LLC (805) 684-3838
- Marine Spill Response Corporation (MSRC) Tel: (510) 478-0702
- National Response Corporation (NRC) Tel: (562) 506-2060
- Patriot Environmental Services (562) 244-2204
- Foss Maritime or another closer response team and request response to clean up the fuel

CLEAN UP SPILL AND USED SPILL MATERIALS

- Gather soaked rags, absorbents, boom and dirt
- Place in leak proof containers for storage and disposal

EMPLOYEE TRAINING ON OIL SPILL CONTINGENCY PLAN

Prior to the departure of the vessel for any activities, all Captain and crew members on the vessel will have read the Oil Spill Contingency Plan, understand procedures to be implemented in the event of an oil spill, and know where the oil spill kit is located on the vessel.

EMERGENCY EQUIPMENT

LOCATION

As part of each job start-up safety meeting, the spill containment and cleanup material will be discussed and verified.

EQUIPMENT

The Spill Containment and Cleanup Materials include:

- 1 Box of 20 Gloves: in spill kit box located in front compartment of vessel
- 2 pair Goggles: in spill kit box located in front compartment of vessel
- 1 Box of Rags:in spill kit box located in front compartment of vessel
- 1 Box of 20 Garbage bags: in spill kit box located in front compartment of vessel
- 30 each Absorbent pads: spill kit box located in front compartment of vessel
- 1 Small Oil Boom: located on back deck
- 1 12lb Bag Granular absorbent (“kitty litter”): located in fron compartment of vessel
- 1 Shovel: located on back deck

FIRE EXTINGUISHERS ARE MOUNTED ON ALL VESSELS, PICKUP TRUCKS AND THERE IS ONE IN THE OFFICE. THE FIRE EXTINGUISHER WILL BE CHECKED FOR EXPIRATION DATE AND THE LOCATION DISCUSSED AT EACH SAFETY MEETING.

INVENTORY & RESTOCKING

The on-board spill containment and cleanup materials are inventoried by the Foreman at the start of every job, at least monthly and after a spill response. Depleted items are to be reported to the Superintendent or any member of the office staff. Items are to be ordered immediately and restocked promptly.

NOTIFICATIONS

In case of a spill, notify a Fugro 24 hour representative (see addendum 1 for names and phone numbers).

GIVE THE FOLLOWING INFORMATION TO THE BEST OF YOUR ABILITY:

- Your name
- Location
- Date of spill
- Time of spill
- Substance spilled
- Quantity spilled
- Potential for continued spill
- Possible health hazard
- Source of spill
- Actions taken
- Threatened resources/utilites

THE ENVIRONMENTAL COORDINATOR WILL:

- Notify the applicable local, state and federal authorities
- Coordinate and disseminate information to the media
- Handle the legal obligations and responsibilities of the company

Addendum 1

Emergency Notification

PHONE LIST

Fugro , Inc.
Office 805-650-7000

California State Lands Commission
24-Hour Emergency Number 562-590-5201

Fire Emergency	**911**	**911**
Medical Emergency	**911**	**911**

Addendum 2

Guide for Fugro Management

1. Call for outside assistance if appropriate for the spill.

2. Call the Company Environmental and Safety Coordinator to coordinate the legal notifications and media inquiries:

3. If there is an **actual** release to the environment, the U.S. EPA Emergency Response Program requires notification to **one** of the following organizations:

NATIONAL RESPONSE CENTER	1-800-424-8802
U.S. COAST GUARD MARINE SAFETY OFFICE	1-510-437-3073
	1-510-437-3074

4. Other organizations that may be involved:

U.S. EPA Hazardous Waste	1-415-744-2000
California Office of Emergency Services	1-800-852-7550
Additional number	1-916-427-4287
State of California Water Quality	1-510-286-1255
State of California Fish & Game	1-707-944-5512
After hours and weekends	1-916-445-0045
Vessel Traffic	1-415-556-2760
Ca Oiled Wildlife Care Network	1-916-445-0045

5. The information that will be requested is attached as Addendum # 6.

Addendum 3

Fugro ,Owner, and Management Information

Fugro Environmental and Safety Coordinator

Jeffery Ripper 858-427-2017

Officers of the Corporation

David Millar 858-945-3699

Eddie Stutts 805-432-2213

Addendum 4

OPERATIONAL INFORMATION

NORMAL OPERATIONS

We contract with public and private entities to conduct high resolution low energy geophysical and geotechnical engineering surveys.

To accomplish this work, we purchase equipment, tools, material, and supplies which are gathered at various mobilization sites and loaded onto vessels and barges which are berthed alongside a dock. When needed tugboats move barges to and from the jobsites. At the completion of projects, the reverse process takes place - unloading equipment, materials, tools, and supplies.

POTENTIAL SPILLS DUE TO NORMAL OPERATIONS

Oil, grease, fuel, or hydraulic fluid leak from machinery or equipment

Cranes, winches, generators, light plants and boats require fluids to operate.

- Fluids could leak onto the vessel or into the water

Oil, grease, or fuel spill from storage

Oil and grease are stored in the vessels and/or barges in 5 gallon or smaller plastic buckets.

- Buckets could be dropped or punctured in transport

Fuel is stored in steel tanks housed on the vessels.

- Tanks could be punctured by sharp objects

Paint spill

Paint is generally purchased and utilized as needed. If extra is kept, one gallon pails and spray cans could be stored below deck.

- Pails could be punctured or tipped over during use

Addendum 5

PRODUCT USAGE INFORMATION

CHEMICALS AND FUELS (DESCRIPTION & QUANTITIES)

SDS sheets are available on the vessel, and the Fugro office.

Oil	< 4 quarts
Gasoline	< 100 gallons

Addendum 6

SPILLS RESULTING FROM VESSEL FUELING

All vessel fueling will be conducted on land at a gas station or at an approved docking facility. No cross vessel fueling will be performed.

VERIFICATION OF EQUIPMENT SERVICE

Fugro Pelagos, Inc.
Pre-Mobilization Equipment Inspection Record

Instrument/System Type/Description(s): Edge tech 4125 Side Scan and ODOM CV100

Make/Model Number(s): 4125 CV100

Serial Number(s): 48241, 45690, 002967

General Parts	Premobilization Inspection Checks	Check	Notes	Technician Initials
Housing	Visual inspection of housing. Note any structural damage, signs of electrolysis and overall cleanliness. Repair/replace/clean as needed.	✓	48241 Slight damage on nose cone 45690 Decals Missing	MW
	Visually inspect transducers, sound sources or other sensors.	✓		MW
Cables & Connections	Check for damage along entire cable length of all cables, if a cable is marked with lengths, verify labels and distances.	✓		MW
	Check cable ends and connections for looseness, corrosion and any sign of electrical arcing at the pins. Repair/replace/clean as needed.	✓		MW
	Check all water proof connectors and apply appropriate lubrications – confirm good connection seals and seating.	✓		MW
	Check electronic continuity of all cables.	✓		MW
Hoses	Check entire length of any hoses for damage or leaks.	NA		MW
	Check any hose connections for damage or leaks.	NA		MW

Electronics	Check all power supply output voltages.	✓		MW
	Ensure all electronics power up properly and display appropriate indicator lights.	✓		MW
	No observed alarms (visual, audible, or other).	✓		MW
Programming	Confirm up to date firmware version(s).	✓		MW
	Confirm up to date software version(s).	✓		MW
	Confirm license expiration date(s).	NA		MW
Communications	Check all RS232 communications.	NA		MW
	Check all USB communications.	NA		MW
	Check all LAN communications.	✓		MW
	Check all wireless communications.	NA		MW
	Check all other communication types.	✓		MW
Testing	Bench test system appropriately (note type of test performed – rub test/tap test/audible test).	✓	RUB	MW
	Wet test system appropriately (note type of test performed).	NA		MW

Fugro Pelagos, Inc.
Pre-Mobilization Equipment Inspection Record

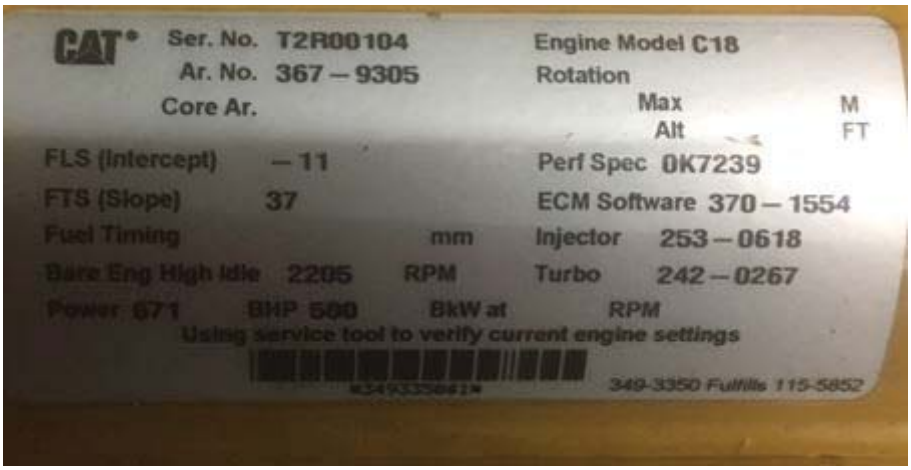
Instrument/System Type/Description(s): Edge tech 4125 Side Scan

Make/Model Number(s): 4125 BGR 603682

Serial Number(s): 48241 , 45690

General Parts	Premobilization Inspection Checks	Check	Notes	Technician Initials
Housing	Visual inspection of housing. Note any structural damage, signs of electrolysis and overall cleanliness. Repair/replace/clean as needed.	✓	48241 Slight damage on nose cone 45690 Decals Missing	MW
	Visually inspect transducers, sound sources or other sensors.	✓		MW
Cables & Connections	Check for damage along entire cable length of all cables, if a cable is marked with lengths, verify labels and distances.	✓		MW
	Check cable ends and connections for looseness, corrosion and any sign of electrical arcing at the pins. Repair/replace/clean as needed.	✓		MW
	Check all water proof connectors and apply appropriate lubrications – confirm good connection seals and seating.	✓		MW
	Check electronic continuity of all cables.	✓		MW
Hoses	Check entire length of any hoses for damage or leaks.	NA		MW
	Check any hose connections for damage or leaks.	NA		MW

Electronics	Check all power supply output voltages.	✓		MW
	Ensure all electronics power up properly and display appropriate indicator lights.	✓		MW
	No observed alarms (visual, audible, or other).	✓		MW
Programming	Confirm up to date firmware version(s).	✓		MW
	Confirm up to date software version(s).	✓		MW
	Confirm license expiration date(s).	NA		MW
Communications	Check all RS232 communications.	NA		MW
	Check all USB communications.	NA		MW
	Check all LAN communications.	✓		MW
	Check all wireless communications.	NA		MW
	Check all other communication types.	✓		MW
Testing	Bench test system appropriately (note type of test performed – rub test/tap test/audible test).	✓		MW
	Wet test system appropriately (note type of test performed).	NA		MW


CAT
Ser. No. T2R00104
Ar. No. 367 – 9305
Core Ar.
Engine Model C18
Rotation
Max
Alt
M
FT
FLS (Intercept) – 11
FTS (Slope) 37
Perf Spec 0K7239
ECM Software 370 – 1554
Fuel Timing mm
Injector 253 – 0618
Bare Eng High Idle 2205 RPM
Turbo 242 – 0267
Power 671 BHP 500 BkW at RPM
Using service tool to verify current engine settings
349-3350 Fulfills 115-5852


CAT
Ser. No. T2R00103
Ar. No. 367 – 9309
Core Ar.
Engine Model C18
Rotation
Max
Alt
M
FT
FLS (Intercept) – 11
FTS (Slope) 37
Perf Spec 0K7239
ECM Software 370 – 1554
Fuel Timing mm
Injector 253 – 0618
Bare Eng High Idle 2205 RPM
Turbo 242 – 0267
Power 671 BHP 500 BkW at RPM
Using service tool to verify current engine settings
349-3350 Fulfills 115-5852

PERFORMANCE DATA[DM9572]

November 9, 2016

Performance Number: DM9572 **Change Level: 01**

SALES MODEL:	C18	**COMBUSTION:**	DI
BRAND:	CAT	**ENGINE SPEED (RPM):**	2,100
ENGINE POWER (BHP):	671	**ASPIRATION:**	TA
COMPRESSION RATIO:	16.5	**AFTERCOOLER TYPE:**	SCAC
RATING LEVEL:	B-RATING (HEAVY DUTY)	**AFTERCOOLER CIRCUIT TYPE:**	JW+OC, AC
PUMP QUANTITY:	1	**AFTERCOOLER TEMP (F):**	126
FUEL TYPE:	DIESEL	**JACKET WATER TEMP (F):**	210.2
MANIFOLD TYPE:	WATER COOLED	**TURBO CONFIGURATION:**	SINGLE
GOVERNOR TYPE:	ELEC	**TURBO QUANTITY:**	1
CAMSHAFT TYPE:	STANDARD	**TURBOCHARGER MODEL:**	S510W010-1.36
IGNITION TYPE:	CI	**CERTIFICATION YEAR:**	2007
INJECTOR TYPE:	EUI	**PISTON SPD @ RATED ENG SPD (FT/MIN):**	2,521.7
REF EXH STACK DIAMETER (IN):	6		
MAX OPERATING ALTITUDE (FT):	984		

	INDUSTRY	SUBINDUSTRY	APPLICATION
	MARINE	OFFSHORE	MARINE PROPULSION
	MARINE	INLAND WATERWAY	MARINE PROPULSION
	MARINE	FERRY	MARINE PROPULSION
	MARINE	GENERAL CARGO	MARINE PROPULSION
	MARINE	DREDGE	MARINE PROPULSION
	MARINE	TUG & SALVAGE	MARINE PROPULSION
	MARINE	FISHING	MARINE PROPULSION

General Performance Data

MAXIMUM LIMIT

ENGINE SPEED	ENGINE POWER	ENGINE TORQUE	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP
RPM	BHP	LB-FT	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	IN-HG	DEG F
2,100	671	1,677	229	0.368	35.2	55.1	137.3	1,127.3	55.7	758.7
2,000	671	1,761	240	0.362	34.6	55.3	137.2	1,131.5	52.4	766.6
1,900	671	1,853	253	0.351	33.6	54.4	136.7	1,126.5	47.9	769.7
1,800	648	1,891	258	0.347	32.1	52.3	135.7	1,129.3	43.2	785.9
1,600	455	1,492	203	0.359	23.3	35.1	131.2	1,131.8	25.1	820.5
1,500	388	1,359	185	0.360	19.9	27.1	129.7	1,131.8	18.3	834.6
1,400	339	1,273	174	0.359	17.4	20.8	127.8	1,131.8	13.6	841.3
1,200	272	1,193	163	0.356	13.9	12.9	123.0	1,131.8	8.1	842.2
1,100	247	1,180	161	0.355	12.5	10.2	120.4	1,131.8	6.4	837.9
1,000	235	1,235	168	0.356	12.0	9.7	103.1	1,131.8	5.3	810.7
900	216	1,263	172	0.355	11.0	7.8	90.8	1,100.7	4.2	770.9
800	176	1,157	158	0.341	8.6	4.0	90.1	962.9	3.4	687.8
700	134	1,007	137	0.384	7.4	3.2	79.7	887.6	3.3	619.2
600	101	880	120	0.349	5.0	2.4	114.1	841.6	1.7	506.4

MAXIMUM LIMIT

ENGINE SPEED	ENGINE POWER	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
RPM	BHP	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
2,100	671	60	384.3	1,604.7	3,751.7	6,949.6	7,196.1	1,513.9	1,392.9
2,000	671	60	376.4	1,561.0	3,675.4	6,747.8	6,990.3	1,473.6	1,354.9
1,900	671	58	362.3	1,493.0	3,506.6	6,428.4	6,663.4	1,402.5	1,287.4
1,800	648	56	350.4	1,404.9	3,302.5	6,011.8	6,231.2	1,303.6	1,196.2
1,600	455	37	268.2	1,022.9	2,442.3	4,304.7	4,466.8	938.0	859.3
1,500	388	29	230.1	840.3	2,026.9	3,513.3	3,652.9	769.9	702.3
1,400	339	22	199.6	696.7	1,695.1	2,897.8	3,019.9	640.6	580.9
1,200	272	13	158.1	504.9	1,230.2	2,084.7	2,182.0	464.6	418.0
1,100	247	11	143.2	438.5	1,052.0	1,805.8	1,893.6	398.6	357.8
1,000	235	10	116.5	486.8	992.3	1,772.2	1,856.3	384.0	343.7
900	216	8	75.7	421.8	876.1	1,642.1	1,719.1	350.0	313.6
800	176	4	310.0	165.9	635.2	1,268.0	1,328.8	272.2	247.4
700	134	2	99.1	266.2	564.5	1,246.2	1,297.7	257.2	236.8
600	101	0	125.8	145.5	261.5	563.7	598.9	133.1	111.0

PERFORMANCE DATA[DM9572]

General Performance Data (Continued)

PROP DEMAND CURVE P

ENGINE SPEED	ENGINE POWER	ENGINE TORQUE	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP
RPM	BHP	LB-FT	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	IN-HG	DEG F
2,100	671	1,677	229	0.368	35.2	55.1	137.3	1,127.3	55.7	758.7
2,000	579	1,521	207	0.364	30.1	48.5	134.9	1,065.2	45.0	734.1
1,900	497	1,373	187	0.355	25.1	39.6	132.4	1,025.7	33.5	728.3
1,800	422	1,232	168	0.355	21.4	30.7	130.5	1,006.7	24.6	734.7
1,600	297	973	133	0.357	15.1	15.9	127.5	973.4	12.4	732.5
1,500	244	856	117	0.358	12.5	11.2	125.7	930.6	9.1	706.0
1,400	199	745	102	0.358	10.2	7.5	122.7	868.0	6.6	664.2
1,200	125	548	75	0.359	6.4	3.1	113.2	702.7	3.6	547.2
1,100	96.4	460	63	0.362	5.0	1.8	107.1	611.6	2.8	482.0
1,000	72.4	380	52	0.371	3.8	1.3	99.5	517.2	2.2	412.5
900	52.8	308	42	0.384	2.9	0.7	93.5	439.8	1.7	355.0
800	37.1	243	33	0.401	2.1	0.4	89.4	370.7	1.3	305.0
700	24.8	186	25	0.437	1.6	0.2	86.7	316.6	1.0	263.4
600	15.6	137	19	0.479	1.1	0.0	85.0	274.1	0.7	231.6

PROP DEMAND CURVE P

ENGINE SPEED	ENGINE POWER	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
RPM	BHP	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
2,100	671	60	384.3	1,604.7	3,751.7	6,949.6	7,196.1	1,513.9	1,392.9
2,000	579	52	341.3	1,459.8	3,312.3	6,265.9	6,475.8	1,364.2	1,260.2
1,900	497	43	294.7	1,255.3	2,808.2	5,345.0	5,521.2	1,162.2	1,074.3
1,800	422	33	252.0	1,044.3	2,348.9	4,407.1	4,556.9	966.9	892.2
1,600	297	17	178.5	706.9	1,562.2	2,944.8	3,050.4	644.2	592.6
1,500	244	12	153.1	596.9	1,282.5	2,478.5	2,566.0	540.9	498.3
1,400	199	8	131.8	507.3	1,047.6	2,101.5	2,172.7	458.3	423.0
1,200	125	3	103.1	384.6	706.3	1,592.4	1,637.2	344.9	321.4
1,100	96.4	2	94.8	341.8	583.4	1,414.8	1,449.7	304.6	285.8
1,000	72.4	1	94.4	306.2	486.8	1,279.6	1,306.4	274.4	259.4
900	52.8	1	90.1	273.9	406.0	1,144.0	1,164.3	245.0	233.1
800	37.1	1	87.8	244.4	339.7	1,022.9	1,037.7	218.4	209.0
700	24.8	0	79.9	214.2	277.0	884.0	894.8	188.4	180.9
600	15.6	-0	85.9	175.7	220.8	738.8	746.3	157.0	151.6

PERFORMANCE DATA[DM9572]

General Performance Data (Continued)

MAXIMUM POWER CURVE M

ENGINE SPEED	ENGINE POWER	ENGINE TORQUE	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP
RPM	BHP	LB-FT	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	IN-HG	DEG F
2,100	671	1,677	229	0.368	35.2	55.1	137.3	1,127.3	55.7	758.7
2,000	671	1,761	240	0.362	34.6	55.3	137.2	1,131.5	52.4	766.6
1,900	671	1,853	253	0.351	33.6	54.4	136.7	1,126.5	47.9	769.7
1,800	648	1,891	258	0.347	32.1	52.3	135.7	1,129.3	43.2	785.9
1,600	631	2,072	282	0.345	31.1	52.0	134.5	1,189.6	37.3	840.8
1,500	614	2,150	293	0.347	30.5	50.1	134.3	1,240.9	33.7	881.4
1,400	550	2,065	281	0.360	28.3	41.4	117.5	1,328.8	26.5	955.0
1,200	324	1,419	193	0.366	16.9	17.3	117.4	1,231.5	10.7	905.1
1,100	288	1,377	188	0.366	15.1	13.2	112.7	1,237.7	7.9	904.1
1,000	247	1,297	177	0.359	12.7	10.5	101.1	1,169.9	5.6	832.7
900	216	1,263	172	0.355	11.0	7.8	90.8	1,100.7	4.2	770.9
800	176	1,157	158	0.341	8.6	4.0	90.1	962.9	3.4	687.8
700	134	1,007	137	0.384	7.4	3.2	79.7	887.6	3.3	619.2
600	101	880	120	0.349	5.0	2.4	114.1	841.6	1.7	506.4

MAXIMUM POWER CURVE M

ENGINE SPEED	ENGINE POWER	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
RPM	BHP	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
2,100	671	60	384.3	1,604.7	3,751.7	6,949.6	7,196.1	1,513.9	1,392.9
2,000	671	60	376.4	1,561.0	3,675.4	6,747.8	6,990.3	1,473.6	1,354.9
1,900	671	58	362.3	1,493.0	3,506.6	6,428.4	6,663.4	1,402.5	1,287.4
1,800	648	56	350.4	1,404.9	3,302.5	6,011.8	6,231.2	1,303.6	1,196.2
1,600	631	55	338.7	1,270.3	3,126.0	5,396.9	5,614.7	1,181.8	1,078.5
1,500	614	53	331.6	1,176.3	2,988.2	4,991.5	5,204.9	1,095.6	994.2
1,400	550	43	303.7	950.1	2,567.4	4,247.6	4,441.3	892.3	796.2
1,200	324	18	190.7	571.4	1,429.8	2,393.3	2,511.9	515.1	458.6
1,100	288	14	167.7	466.1	1,203.4	1,957.2	2,062.7	433.8	385.4
1,000	247	11	119.4	505.7	1,037.6	1,828.1	1,917.1	394.7	352.1
900	216	8	75.7	421.8	876.1	1,642.1	1,719.1	350.0	313.6
800	176	4	310.0	165.9	635.2	1,268.0	1,328.8	272.2	247.4
700	134	2	99.1	266.2	564.5	1,246.2	1,297.7	257.2	236.8
600	101	0	125.8	145.5	261.5	563.7	598.9	133.1	111.0

Heat Rejection Data

MAXIMUM LIMIT

ENGINE SPEED	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHUAST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
RPM	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN
2,100	671	17,034	1,604	26,331	12,337	4,029	7,317	28,434	75,637	80,572
2,000	671	16,542	1,563	24,954	12,228	3,914	6,967	28,434	73,481	78,276
1,900	671	16,466	1,533	23,931	11,751	3,839	6,601	28,434	72,070	76,772
1,800	648	16,140	1,461	22,482	11,432	3,673	6,117	27,490	68,964	73,464
1,600	455	16,601	1,450	20,949	8,875	3,558	5,732	26,774	66,792	71,150
1,500	388	17,174	1,464	19,858	7,501	3,484	5,402	26,040	65,409	69,677
1,400	339	20,122	1,416	17,883	6,303	3,373	5,006	23,345	63,336	67,469
1,200	272	13,664	857	8,361	4,581	1,936	2,269	13,745	36,342	38,714
1,100	247	13,044	785	6,763	3,948	1,723	1,769	12,227	32,351	34,462
1,000	235	10,222	500	4,739	3,657	1,360	1,280	10,470	25,533	27,199
900	216	10,033	426	4,368	3,091	1,254	1,181	9,179	23,550	25,086
800	176	9,476	351	3,570	1,955	1,057	978	7,473	19,853	21,148
700	134	7,889	270	2,745	1,866	843	761	5,693	15,819	16,851
600	101	5,444	184	1,467	356	574	310	4,265	10,770	11,472

Emissions Data

RATED SPEED POTENTIAL SITE VARIATION: 2100 RPM

ENGINE POWER		BHP	671	503	335	168	67.1
PERCENT LOAD		%	100	75	50	25	10
TOTAL NOX (AS NO2)		G/HR	3,325	2,239	1,791	724	414
TOTAL CO		G/HR	563	358	378	505	506
TOTAL HC		G/HR	70	67	61	56	68
PART MATTER		G/HR	115.5	90.9	94.7	166.3	124.6
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	2,009.9	1,771.3	2,092.4	1,407.2	1,318.5
TOTAL CO	(CORR 5% O2)	MG/NM3	336.3	280.1	440.9	978.3	1,618.4
TOTAL HC	(CORR 5% O2)	MG/NM3	36.6	45.7	62.0	94.0	188.7
PART MATTER	(CORR 5% O2)	MG/NM3	58.5	61.4	97.2	286.4	360.8
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	979	863	1,019	685	642
TOTAL CO	(CORR 5% O2)	PPM	269	224	353	783	1,295
TOTAL HC	(CORR 5% O2)	PPM	68	85	116	175	352
TOTAL NOX (AS NO2)		G/HP-HR	4.99	4.47	5.36	4.33	6.18
TOTAL CO		G/HP-HR	0.84	0.72	1.13	3.02	7.56
TOTAL HC		G/HP-HR	0.11	0.13	0.18	0.33	1.02
PART MATTER		G/HP-HR	0.17	0.18	0.28	0.99	1.86
TOTAL NOX (AS NO2)		LB/HR	7.33	4.94	3.95	1.60	0.91
TOTAL CO		LB/HR	1.24	0.79	0.83	1.11	1.12
TOTAL HC		LB/HR	0.15	0.15	0.13	0.12	0.15
PART MATTER		LB/HR	0.25	0.20	0.21	0.37	0.27

RATED SPEED NOMINAL DATA: 2100 RPM

ENGINE POWER		BHP	671	503	335	168	67.1
PERCENT LOAD		%	100	75	50	25	10
TOTAL NOX (AS NO2)		G/HR	3,079	2,073	1,658	670	383
TOTAL CO		G/HR	301	191	202	270	271
TOTAL HC		G/HR	37	35	32	30	36
TOTAL CO2		KG/HR	376	286	192	113	68
PART MATTER		G/HR	59.2	46.6	48.6	85.3	63.9
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	1,861.0	1,640.1	1,937.4	1,303.0	1,220.8
TOTAL CO	(CORR 5% O2)	MG/NM3	179.9	149.8	235.8	523.1	865.4
TOTAL HC	(CORR 5% O2)	MG/NM3	19.4	24.2	32.8	49.7	99.8
PART MATTER	(CORR 5% O2)	MG/NM3	30.0	31.5	49.8	146.9	185.0
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	906	799	944	635	595
TOTAL CO	(CORR 5% O2)	PPM	144	120	189	419	692
TOTAL HC	(CORR 5% O2)	PPM	36	45	61	93	186
TOTAL NOX (AS NO2)		G/HP-HR	4.62	4.14	4.96	4.01	5.72

PERFORMANCE DATA[DM9572]

November 9, 2016

TOTAL CO	G/HP-HR	0.45	0.38	0.61	1.61	4.04
TOTAL HC	G/HP-HR	0.06	0.07	0.10	0.18	0.54
PART MATTER	G/HP-HR	0.09	0.09	0.15	0.51	0.95
TOTAL NOX (AS NO2)	LB/HR	6.79	4.57	3.66	1.48	0.84
TOTAL CO	LB/HR	0.66	0.42	0.45	0.60	0.60
TOTAL HC	LB/HR	0.08	0.08	0.07	0.07	0.08
TOTAL CO2	LB/HR	828	631	422	250	150
PART MATTER	LB/HR	0.13	0.10	0.11	0.19	0.14
OXYGEN IN EXH	%	9.7	11.1	12.2	14.0	16.0
DRY SMOKE OPACITY	%	1.5	1.4	2.1	5.4	4.5
BOSCH SMOKE NUMBER		1.01	0.95	1.35	2.42	2.21

Regulatory Information

EPA TIER 2		2007 - 2013		
GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 94.103 AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THIS ENGINE CONFORMS TO US EPA MARINE COMMERCIAL COMPRESSION-IGNITION EMISSION REGULATIONS. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE MARINE REGULATIONS.				
Locality	**Agency**	**Regulation**	**Tier/Stage**	**Max Limits - G/BKW - HR**
U.S. (INCL CALIF)	EPA	MARINE COMMERCIAL	TIER 2	CO: 5.0 NOx + HC: 7.2 PM: 0.20

IMO	2000 - 2010
GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN REGULATION 13 OF ANNEX VI OF MARPOL 73/78 AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THIS ENGINE CONFORMS TO INTERNATIONAL MARINE ORGANIZATION'S (IMO) MARINE COMPRESSION-IGNITION EMISSION REGULATIONS.

Cross Reference

Test Spec	Setting	Engine Arrangement	Engineering Model	Engineering Model Version	Start Effective Serial Number	End Effective Serial Number
0K8274	PP5869	2905687			J2K00001	
0K8274	PP5869	2905695	E925	-	J2K00001	
0K8274	PP5869	3209792			T2P00001	
0K8274	PP5869	3209793	E925	-	T2P00001	
0K8274	PP5869	3458307	E925	-	T2P00001	
0K8274	PP5869	3458311	E925	-	T2P00001	

Performance Parameter Reference

Parameters Reference:DM9600-08

PERFORMANCE DEFINITIONS

PERFORMANCE DEFINITIONS DM9600

APPLICATION:
Engine performance tolerance values below are representative of a typical production engine tested in a calibrated dynamometer test cell at SAE J1995 standard reference conditions. Caterpillar maintains ISO9001:2000 certified quality management systems for engine test Facilities to assure accurate calibration of test equipment. Engine test data is corrected in accordance with SAE J1995. Additional reference material SAE J1228, J1349, ISO 8665, 3046-1:2002E, 3046-3:1989, 1585, 2534, 2288, and 9249 may apply in part or are similar to SAE J1995. Special engine rating request (SERR) test data shall be noted.

PERFORMANCE PARAMETER TOLERANCE FACTORS:

Power	+/- 3%
Torque	+/- 3%
Exhaust stack temperature	+/- 8%
Inlet airflow	+/- 5%
Intake manifold pressure-gage	+/- 10%
Exhaust flow	+/- 6%
Specific fuel consumption	+/- 3%
Fuel rate	+/- 5%
Specific DEF consumption	+/- 3%
DEF rate	+/- 5%
Heat rejection	+/- 5%
Heat rejection exhaust only	+/- 10%
Heat rejection CEM only	+/- 10%

Heat Rejection values based on using treated water.

Torque is included for truck and industrial applications, do not use for Gen Set or steady state applications.

On C7 - C18 engines, at speeds of 1100 RPM and under these values are provided for reference only, and may not meet the tolerance listed.

These values do not apply to C280/3600. For these models, see the tolerances listed below.

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C280/3600 HEAT REJECTION TOLERANCE FACTORS:

Heat rejection	+/- 10%
Heat rejection to Atmosphere	+/- 50%
Heat rejection to Lube Oil	+/- 20%
Heat rejection to Aftercooler	+/- 5%

TEST CELL TRANSDUCER TOLERANCE FACTORS:

Torque	+/- 0.5%
Speed	+/- 0.2%
Fuel flow	+/- 1.0%
Temperature	+/- 2.0 C degrees
Intake manifold pressure	+/- 0.1 kPa

OBSERVED ENGINE PERFORMANCE IS CORRECTED TO SAE J1995 REFERENCE AIR AND FUEL CONDITIONS.

REFERENCE ATMOSPHERIC INLET AIR
FOR 3500 ENGINES AND SMALLER
SAE J1228 AUG2002 for marine engines, and J1995 JAN2014 for other engines, reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity at the stated aftercooler water temp, or inlet manifold temp.

FOR 3600 ENGINES
Engine rating obtained and presented in accordance with ISO 3046/1 and SAE J1995 JANJAN2014 reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity and 150M altitude at the stated aftercooler water temperature.

MEASUREMENT LOCATION FOR INLET AIR TEMPERATURE
Location for air temperature measurement air cleaner inlet at stabilized operating conditions.

REFERENCE EXHAUST STACK DIAMETER
The Reference Exhaust Stack Diameter published with this dataset is only used for the calculation of Smoke Opacity values displayed in this dataset. This value does not necessarily represent the actual stack diameter of the engine due to the variety of exhaust stack adapter options available. Consult the price list, engine order or general dimension drawings for the actual stack diameter size ordered or options available.

REFERENCE FUEL
DIESEL
Reference fuel is #2 distillate diesel with a 35API gravity;
A lower heating value is 42,780 KJ/KG (18,390 BTU/LB) when used at 29 (84.2), where the density is 838.9 G/Liter (7.001 Lbs/Gal).

GAS
Reference natural gas fuel has a lower heating value of 33.74 KJ/L (905 BTU/CU Ft). Low BTU ratings are based on 18.64 KJ/L (500 BTU/CU FT) lower heating value gas. Propane ratings are based on 87.56 KJ/L (2350 BTU/CU Ft) lower heating value gas.

ENGINE POWER (NET) IS THE CORRECTED FLYWHEEL POWER (GROSS) LESS EXTERNAL AUXILIARY LOAD
Engine corrected gross output includes the power required to drive standard equipment; lube oil, scavenge lube oil, fuel transfer, common rail fuel, separate circuit aftercooler and jacket water pumps. Engine net power available for the external (flywheel) load is calculated by subtracting the sum of auxiliary load from the corrected gross flywheel out put power. Typical auxiliary loads are radiator cooling fans, hydraulic pumps, air compressors and battery charging alternators. For Tier 4 ratings additional Parasitic losses would also include Intake, and Exhaust Restrictions.

ALTITUDE CAPABILITY
Altitude capability is the maximum altitude above sea level at standard temperature and standard pressure at which the engine could develop full rated output power on the current performance data set.

Standard temperature values versus altitude could be seen on TM2001.

When viewing the altitude capability chart the ambient temperature is the inlet air temp at the compressor inlet.

Engines with ADEM MEUI and HEUI fuel systems operating at conditions above the defined altitude capability derate for atmospheric pressure and temperature conditions outside the values defined, see TM2001.

Mechanical governor controlled unit injector engines require a setting change for operation at conditions above the altitude defined on the engine performance sheet. See your Caterpillar technical representative for non standard ratings.

REGULATIONS AND PRODUCT COMPLIANCE
TMI Emissions information is presented at 'nominal' and 'Potential Site Variation' values for standard ratings. No tolerances are applied to the emissions data. These values are subject to change at any time. The controlling federal and local emission requirements need to be verified by your Caterpillar technical representative.

Customer's may have special emission site requirements that need to be verified by the Caterpillar Product Group engineer.

EMISSIONS DEFINITIONS:
Emissions : DM1176

HEAT REJECTION DEFINITIONS:
Diesel Circuit Type and HHV Balance : DM9500

HIGH DISPLACEMENT (HD) DEFINITIONS:
3500: EM1500

RATING DEFINITIONS:
Agriculture : TM6008

Fire Pump : TM6009

Generator Set : TM6035

Generator (Gas) : TM6041

Industrial Diesel : TM6010

Industrial (Gas) : TM6040

Irrigation : TM5749

Locomotive : TM6037

Marine Auxiliary : TM6036

Marine Prop (Except 3600) : TM5747

Marine Prop (3600 only) : TM5748

MSHA : TM6042

Oil Field (Petroleum) : TM6011

Off-Highway Truck : TM6039

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On-Highway Truck : TM6038

SOUND DEFINITIONS:
Sound Power : DM8702

Sound Pressure : TM7080

Date Released : 7/7/15